Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at http://about.jstor.org/participate-jstor/individuals/early-journal-content.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

yellow paint found so frequently among the Western Indians. The Apaches of Arizona carry a portion of it carefully in a small buckskin bag. It is considered a charm when applied to the face, and a cross of this color on the feet enables them to pass their enemies unseen.

——:o:——

THE MAPLE-TREE BARK-LOUSE.

BY EMILY A. SMITH.

THE fruit and ornamental trees grown throughout the country are affected more or less by insects belonging to the *Coccidæ* family, or as they are commonly known, bark-lice. The elm and maple are among the number, the former infested with a *Mytilaspis* and the latter with *Lecanium acericorticis* Fitch.

The first account we find of this insect is from Dr. Asa Fitch, of Salem, New York, in the Horticultural report of that State, in 1859, page 776. From that time nothing further was written until 1867, when Walsh and Riley, probably from oversight of the former article, together with figure 1, renamed the species as *Lecanium acericola* in the American Entomologist, vol. 1, page 14, since which time it has been considered under the latter name, but as Dr. Fitch has priority to the species, I would desire re-establishing the first name, *Lecanium acericorticis* of Fitch.

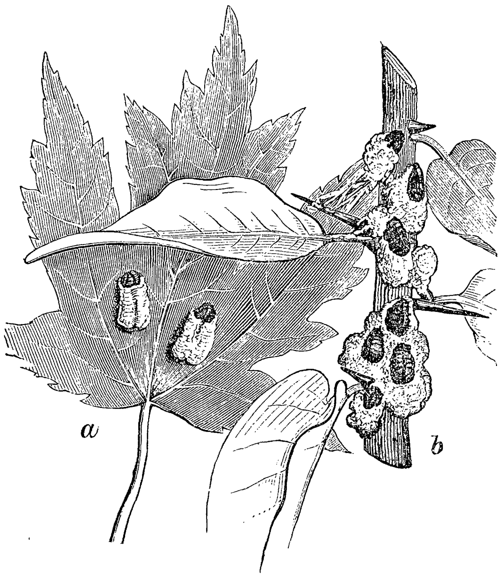


FIG. 1.—*a*, *Lecanium* on Maple; *b*, *Lecanium* on Osage Orange.

Throughout the eastern and western States this insect occurs quite plentifully upon *Acer dasycarpum* and *saccharinum*, and I have carefully studied its life history, which will be published in the Seventh Entomological report of

Illinois, now in the hands of the printer, from which this article is drawn. The illustrations are from the pencil of J. H. Emerton.

Mr. J. Duncan Putnam, of Davenport, Iowa, has given much time and study to the embryological development of this species; his valuable paper will appear in volume ii, part ii, of Proc. Dav. Acad. of Nat. Sciences, now in press.

During the winter months the females remain on the underside of the limbs in a dormant state (fig. 2, *a*), the beak inserted just under the bark. The greatest irregularity exists in reference to the position which they assume on the limbs, the bodies oftentimes overlapping each other, and when greatly crowded lying in opposite directions with the exception that they are always found lying lengthwise with the limb.

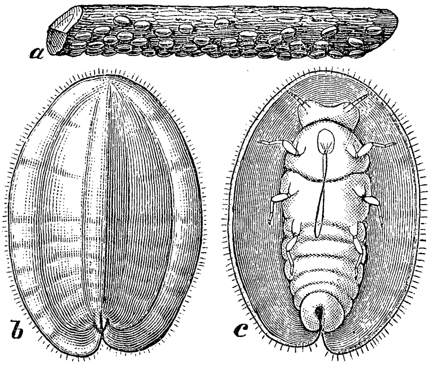


FIG. 2.—*a*, females on limb as in winter; *b*, dorsal view of female; *c*, ventral view of the same. *b* and *c* greatly enlarged.

They are at this time not over 2 mm. in length, much the color of the bark, oval in form and with a slit at posterior end; when raised from the limb the legs and antennæ are plainly visible (fig. 2, *b* and *c*). As soon as the sap commences to flow in early spring, with us near the middle of April, the insect absorbs nourishment from the tree and by the development of the eggs within the body becomes greatly distended. At this time small liquid drops are seen upon the ground and sidewalks underneath the fested trees, which is both sweet and sticky. This liquid issues from the pores of the body and continues until a waxy secretion is observed issuing from the posterior portion. This secretion issues from the general under surface but more particularly from the thorax and abdomen.

Projecting from the sides of the body can be seen, under a common lens, short thick hairs; from these points and from between the abdominal joints a portion of the waxy mass is secreted, but from around the anus comes the greater quantities.

In this cottony secretion the eggs are concealed, the work going on regularly, since we find the first eggs in the mass shortly after it is perceived, and the insect continues partaking of the sap during the deposition. The secretion, at first is soft and sticky, but solidifies somewhat by contact with the air and remains perfect in form on the limbs after the eggs have all hatched (figure 3, *a*). A description is given below.[1]

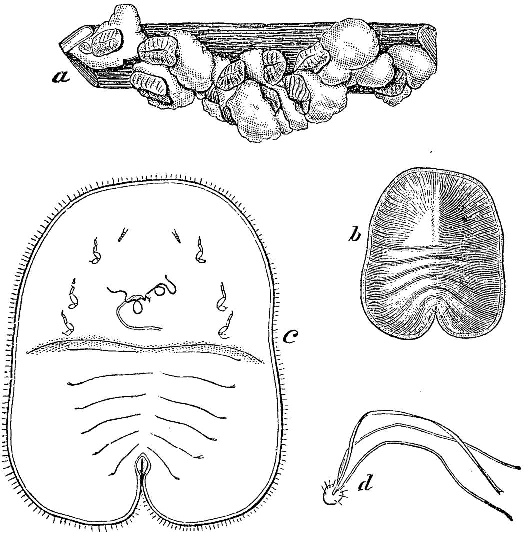


FIG. 3.—*a*, Egg mass of female; *b*, dorsal view of full grown female; *c*, ventral view of same; *d*, view of beak enlarged.

The first eggs appear about the end of May in this vicinity and are concealed in the waxy mass, the particles dividing them one from the other; these issue from the oviduct which has the opening at the posterior portion of the fissure. When the eggs first appear they are soft and pliable, but afterward harden, and as the embryos develop the color deepens. The eggs number from five hundred to one thousand, the deposition occupying from three to six weeks, the process being a gradual one. Some three weeks after the first eggs are deposited the first young lice appear and thus continue until all the eggs are hatched. The body of the female does not shrink in size as is observed in some species of *Coccidæ*, but continues absorbing nourishment until the ovisac is emptied, when she withdraws her beak from the limb and dies,

[1] *Lecanium acericorticis* Fitch, fully grown female. Dorsal view. Oval with dorsal convex carina; an anal fissure at extremity. Three thoracic and seven abdominal segments. Margin furnished with short bristly hairs. Eyes absent. Oviduct situated at end of posterior fissure. Color somewhat lurid with numerous dark blotches, the lines separating the segments darker.

Ventral view.—Antennæ and legs visible but small. The beak arises from a tubercle situated at the extreme end of the head which forms a projection extending slightly over the thorax. The beak itself is a long thread-like organ composed of four distinct pieces. The first pair of legs are nearly opposite the beak, the head and thorax occupying over one half the entire insect. Opening of oviduct at end of fissure. Length 5 mm.

the dead body remaining attached to the limb by means of the cottony secretion. Athough the antennæ and legs do not develop in the same degree with the body, they are not entirely useless, since by removing a grown female in the spring from the limb the insect will move slowly, even though in their natural condition they cease all movement after settling down in the autumn upon the limbs.

The young lice first appear about the middle of June, and are more than twice as long as broad. They are light sordid yellow, translucent, elongated-oval, tapering slightly toward the posterior end, with seven abdominal segments,the division lines being darker and plainest in the middle. Short hairs project from around the margin at regular intervals.

The antennæ and legs are situated some distance from the margin and are inserted on the underside of the body. The antennæ are armed with several strong spines and are jagged in outline. The legs are stout, terminating in a single curved claw and four knobbed hairs.

The beak is a long thread-like organ, very minute, and until the young louse becomes stationary is folded in a loop in the abdomen. At the end of the abdomen, arising from tubercles, projects two anal appendages or setæ longer than the entire body which disappear in a short time. In the natural condition the young insects settle down upon the leaves of the maple within three days after hatching, the preference given the underside and near the midrib, although they are found upon the upper side to some extent, probably because the epidermis is more tender on the under side and they are there protected from the sun's rays. The beak is at once withdrawn from its retreat and is inserted in the leaf, when the insect increases rapidly.

When in a state of rest the young lice draw the antennæ under and parallel with the last joint of the fore pair of legs. The two remaining pair extending backward.

Although they seldom leave the first assumed position until autumn, they have full use of their legs, since when the leaf is detached from the tree, the young lice will withdraw their beaks and move quite actively about in search of fresh food. When first hatched the males and females are not easily distinguished from each other; they soon, however, present quite a difference, the males becoming longer, lighter in color and somewhat higher than the others, and two anal setæ are seen projecting from the scale. This occurs during the last week in July, and although no regular or sudden transition takes place, yet during the fore part of August the males appear, leaving behind the empty larval scales on the leaf, which are easily seen scattered about among the females upon both upper and lower sides of the leaf.

The male louse is very different from the female. During the transformation he has acquired wings for the new sphere into which he is about to enter, although he still retains the legs and antennæ, the beak is abortive, its place represented by two round spots. The three parts, head, thorax and abdomen are easily distinguished. The first males were observed August 13th, 1877, and continued appearing over two weeks. They are very active, flying about the leaves with great rapidity. At this time coition takes place, and the ovaries become developed in the impregnated females, which remain on the leaves drawing sap continually during the entire summer.

The Male-Louse.—Comparatively few of the male-lice have as yet been discovered by entomologists, and it was with pleasure that the male of *Lecanium acericorticis* Fitch was found during the summer of 1877. Their existence is for a brief period, since they are not found longer than three weeks in the year; the probable life of each individual not being over a few hours. While the female is destined to remain upon the tree during its entire existence—a few weeks over one year—the males acquire wings and fly about. That the males are necessary for the perpetuation of the species is doubted by some authors. I made an estimate of the number of larval scales on several leaves, and on the trees which had suffered a longer time, and found the average number to be greater upon a much infested and thus diseased tree than upon a healthy and vigorous one upon which the insects had not been so violently destructive. It often happens that a maple-tree will suddenly revive and outgrow the injury of these insects to an extent, even when no attempt has been

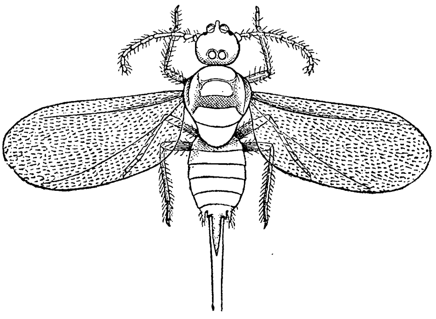


FIG. 4.—*Lecanium acericorticis*, male.

made to exterminate them. Whether this is due to the greater number of the young lice proving to be males or from the effects of parasites remains to be determined.[1]

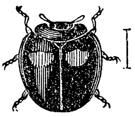
Wings membraneous, hyaline, dotted with short points extending outward, sending out at the base a forked line, one toward the upper, and one toward the lower margin. Mons. V. Signoret says in his essay on *Lecanides*, that in the place of the lower wings of the male there are two halters or balancers, which I have been unable to discover in the mounted specimens before me, although it is quite possible that they may be found in fresh specimens. The females continue absorbing nourishment during the remainder of the summer and return to the limbs at the approach of frost in the autumn. In Fig. 1, Mr. Riley has illustrated the egg-mass as occurring upon the leaf, which is contrary to my experience in Illinois and Iowa, although were the season longer it might be the case, and thus become double-brooded since it is well known that the varied temperature has great effect upon the length of time insects remain in their several stages.

Three kinds of Lady-birds (*Coccinelidæ*), are found more or less numerous upon the infested trees destroying the *acericorticis* during the summer months. The *Hyperaspis signata* Olivier is perhaps the most abundant and valuable. The larva is small, light colored, and covered with a peculiar white downy substance. They are found inside the waxy mass devouring the eggs, and through their assistance many are thus destroyed before hatching. The outside of the egg-mass appears entire, but by carefully separating it, the larva can be observed, in the act of devouring the contents of the egg, by the aid of a common lens. Only one larva is found in each egg-mass. When fully grown and about to change to the pupa state, they emerge and attach themselves to the tree. The imago is a small black beetle with one bright red spot on each elytra.

The *Chilocorus bivulnerus* Muls. (Fig. 5), although not found in such numbers as the *signata* are equally as important since they destroy the young lice. The larvæ are readily recognized from the larvæ of the former by being covered with a large number of black spines, they are considerably larger, and are not found inside the egg-mass. They are ravenous feeders, and require a great number of lice before they complete their larval state. The imago resembles the *signata* in color, but is much larger and equally voracious with the young.

---

[1] *Lecanium acericorticis* male, see Fig. 4. Color fuliginous, with the thoracic segments darker than the remainder of the body. Head small, angular in front, and at the sides. Antennæ 10-jointed, filiform, pubescent, fourth, fifth and sixth longest. Color light brown. There are two ocelli between the antennæ. Thorax large, the mesothoracic band distinct, shiny, the metathorax forming an arched shield extending a short distance over the abdomen. Legs stout, sparsely covered with hairs, tarsi furnished with two claws at the end. Abdomen ends in a tubercle which protects the penis, the entire nearly half as long as abdomen.



The *Anatis* 15-*punctata* is also beneficial in its destruction of the *acericorticis*, and is larger even than the preceding ones, but does not occur so plentifully.

The larvæ are furnished with six rows of stout spinulated spines along the body, the upper surface of which is black, while beneath it is pale, and is nearly half an inch in length. The beetle is black on the head and prothorax, having seven black spots on the brownish-red elytra, and a black spot on the scutellum; it is seven-twentieths of an inch in length.

The larvæ of a species of *Chrysopa* are found assisting in the work of destroying the enemy, but not in any considerable numbers, as also two species of *Reduvidæ* and one *Acarus*.

The females are destroyed by means of a parasite which live upon the fatty substance without disturbing the vital organs, and only destroys the insect when changing to the pupa state inside the body of the other from which it emerges through a cylindrical hole on the dorsal side. This parasite is double-brooded, the second brood appearing the middle of August. The insect belongs to the genus *Coccophagus*, thanks to Mr. E. T. Cresson for its determination, and appears to be undescribed (figure 6).[1]

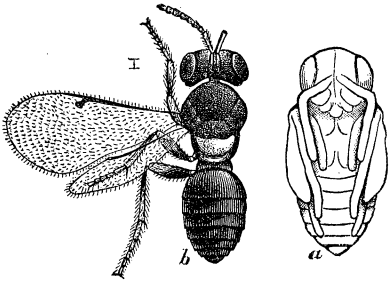


FIG. 6.—*Coccophagus lecanii* nov. sp. *a*, pupa; *b*, imago; hair lines natural size.

---

[1] *Coccophagus lecanii*, nov. sp. Fig. 6. Body elliptical oval; color cinereous. Head as broad as the thorax, smoky brown in color, and pubescent. Antennæ eight-jointed, first joint longest. Thorax nearly black, with a crescent-shaped spot of pale yellow placed crosswise upon the hind part of the thorax. Abdomen elliptical, a little longer than the thorax. Legs light brown with the femora darker, hairy, furnished at the apex of tibiæ with a spur; tarsi five-jointed, first joint longest.

Wings membraneous, hyaline, ciliated. Fore wings with the rib-vein running parallel with the margin nearly one-half its length, where it unites and ends in a stigma somewhat beyond the middle. The lower wings smaller, without veins, the hairs forming a fringe on the lower side.